Their form is linear, margin entire, glabrous. Each has two main fibro-vascular bundles parallel to one another, and two or more lateral ones, also parallel to these; they all give off lateral bundles which anastomose freely. The hypocotyledonary portion of the stem extends to a length of about one to two inches; it is compressed in a plane parallel to that of the cotyledons, and is slightly swollen immediately below the point of junction with them.

Though the cotyledons are completely withdrawn from the seed at an early stage, a physiological connection is kept up between the seedling and the endosperm by a peculiar structure, produced apparently by a lateral swelling of the hypocotyledonary portion of the stem. The time and manner of its development I have not yet been able to ascertain, but in one seedling of twelve days it was found lying parallel to the cotyledons, these being still inclosed in the endosperm, whereas in the mature seeds I have not been able as yet to see any trace of it.

This structure remains in close connection with the endosperm, and is probably useful in transferring the nutritive substances from it to the embryo after the cotyledons have been withdrawn. As far as I can see at present, this lateral structure is produced merely by a process of lateral extension of tissues. The fibro-vascular bundles curve slightly into the protrusion, but I have observed no special modification of the tissues further than a lateral extension. If this be the case, it may be considered morphologically as an emergence.

It has been already observed by Strasburger ("Angiospermen und Gymnospermen," p. 155, Plate xxii., Figs. 90, 91, 93) that in the ripe embryo of Welwitschia an apical papilla is to be seen between the cotyledons; but his observations were conducted only on embryos in mature but ungerminated seeds; and here, as in other members of the group, the plumule does not develop beyond this condition of a mere papilla till germination begins. In the young seedlings (about six weeks old) which I have had the opportunity of observing, the *plumule consists of two leaves*, decussating with the cotyledons, and between these there is an apical papilla. In the most advanced specimens now growing at Kew these leaves of the plumule are about one-sixteenth of an inch in length, but no further development of leaves is at present to be seen.

These observations suggested a comparison with the youngest specimens preserved in the Kew collections: the result is the discovery of evident traces of the bases of leaf-structures below the well-known pair of large leaves, in the form of ragged ends of fibro-vascular bundles, which run directly into the tissues of the stem. These earlier leaves appear to have been at right angles to those of the existing leaves of the plant, and we may with good reason conjecture that they were the cotyledons. Full proof of this will be afforded if the plants at present growing at Kew remain healthy. If this conjecture be true the pair of large perennial leaves are *the first and only pair of leaves developed from the plumule*, and not cotyledons, as they have been hitherto assumed to be.

Other interesting points in the germination of this plant, together with a description of its minute histology, must be deferred till a later notice. This I hope to be able to publish with illustrations in an early number of the *Quarterly Journal of Microscopical Science*.

F. ORPEN BOWER

The Jodrell Laboratory, Royal Gardens, Kew,
October 9

NOTES

IN the second of a series of articles in the *Pall Mall Gazette* "On Vain Discourse," in the quaint and leisurely style of our remote forefathers, the writer speaks of "the talker who thinketh he hath a vocation to popularise science, not as some of our masters come forth to stir up interest in these matters, but from folly and emptiness." He then proceeds to define him:—"He is a great breeder of vain discourses, for he deemeth that the strong meat of knowledge will sit ill on dainty stomachs, and so sets himself to save them the digesting. He watereth first to the consistency of a small fact to the page, and sweeteneth with many a line of poetry; and if there be a tough morsel of reasoning or a sharp fragment of logical defining, that he carefully throweth aside, 'et pondera rerum minutissimis verbis frangit.' For seasoning there are divers sorts of lights or colours or smells to wonder at, and pictures and tales, and praise of the wonderful nineteenth century, and of science and of such as study it. And so there is made a thin and limpid pabulum, or *extractum scientiæ dilutum*, which will not harm the delicatest, nor indeed do them any good, though it be sweet to the taste and pleasant to the eyes, and have the savour of wisdom. For knowledge that is worthy of being attained needeth faithful striving and endeavour, and skill cometh not but by assiduity in act and exercise—χαλεπὰ τὰ καλά." The lecture season is now beginning, and it would be well that those who attend science lectures should learn to distinguish between the true and the false, and this they can easily do by applying the test given by the *Pall Mall*. The spread of efficient education in science will either extinguish the popular lecture or greatly alter its character. We are glad to see the growth of outside opinion on the subject, as may be inferred from the article alluded to.

WE regret to record the death of Dr. E. J. Sparks, F.R.C.P., of Mentone, which occurred at Crewkerne on the 11th instant. Dr. Sparks has been in failing health for several years, but he is one of those striking instances of what work can be done by an active mind in spite of physical weakness. He was well known as a constant contributor to the *Medical Times*, in which appeared the series of letters on the climate of the Riviera, which were afterwards developed into his excellent book on the Health-Resorts of the Riviera. The preparation of this work occupied the best portion of Dr. Sparks' later years, and it is only three months since he revisited several of the less frequented places on the Eastern Riviera for the sake of a second edition. The book is a truly scientific work. Statistics relating to climate and the various diseases for which the Riviera has been recommended have been collected and tabulated with the greatest diligence and care; and the experience of observers, both lay and medical, as to the beneficial influence of the climate is given with the greatest candour. Besides this work, Dr. Sparks published a few years ago a translation of Dr. King's "Therapeutics," the value of which was greatly enhanced by the introduction of a quantity of new matter carefully collected together from medical periodicals. It was a work of no small labour, necessitating as it did the transformation of all quantitative relations from the German into those employed in the English and American Pharmacopœias. It received on the other side of the Atlantic prompt appreciation in a manner both hurtful and complimentary. Before it could be reprinted from the stereotype plates sent over for the purpose, a pirated fac-simile edition was produced by a publisher who has hitherto forgotten to send a cheque. He brought to his medical practice an unusually thorough knowledge of the science of his profession, and a high-minded devotion to the welfare of his patients which quickly secured the confidence of all who consulted him. In friendship he was staunch, loyal, and self-sacrificing, and his loss will be long felt by a wide circle of friends.

THE following are among the scientific and geographical publications announced for the present season:—By Mr. Murray: "Japan; its History, Traditions, and Religions, with the

Narrative of a Visit in 1872," by Sir E. J. Reed, K.C.B., M.P.; "Unbeaten Tracks in Japan," by Isabella Bird (these works are just published); "Personal Life of David Livingstone," by Dr. W. G. Blackie; "A Pilgrimage to Nejd," by Lady Anne Blunt; "The Power of Movement in Plants," by Charles Darwin, assisted by Francis Darwin; "The Cat; an Introduction to the Study of Back-boned Animals," by St. George Mivart; "Siberia in Europe, a Naturalist's Visit to the Valley of the Petchora," by Henry Seebohm; "The Gardens of the Sun: a Naturalist's Journal on the Mountains and in the Forests and Swamps of Borneo and the Sulu Archipelago," by F. W. Burbidge. Messrs. Allen and Co. announce: "The Expiring Continent; a Narrative of Travel in Senegambia," by A. W. Mitchelson; "A Dictionary of Ethnological and Philological Geography," by Dr. R. G. Latham; "Incidents of a Journey through Nubia to Darfur," by Sydney Ensor, C.E. Among Messrs. Crosby, Lockwood, and Co.'s announcements are: "The Fields of Great Britain; a Text-Book of Agriculture," by Hugh Clements; "A Rudimentary Treatise on Coal and Coal-Mining," by Warington W. Smyth, F.R.S. Messrs. Sampson Low and Co. announce: "New Guinea," by L. M. D'Albertis; "Seven Years in South Africa," by Dr. Holub. Messrs. Longmans promise the second series of Helmholtz's "Popular Lectures on Scientific Subjects," translated by Dr. E. Atkinson. Messrs. Chatto and Windus: "A Simple Treatise on Heat," by W. M. Williams. Macmillan and Co.: "Island Life," by A. R. Wallace; "A Visit to Wazan," by L. S. Watson; "Voyage of the *Vega*," by A. E. Nordenskjöld; "Text-Book of Geology," by Prof. Geikie; "Ideal Chemistry," by Sir Benjamin Brodie, Bart.; "A Treatise on Organic Chemistry," by Professors Roscoe and Schorlemmer; vol. ii. of Mr. F. M. Balfour's "Treatise on Comparative Embryology;" "Anthropology," by Dr. E. B. Tylor; "Mathematical Papers," by the late Prof. Clifford; "History of the Steam Engine," by R. L. Galloway.

The inauguration of the Paris Popular Observatory took place at the Trocadéro Palace on October 11, on the second terrace of the Eastern Tower. Four telescopes—three reflectors and a refractor, have been placed at the disposal of the public. No fee is taken from the visitors, who have only to make application to the Popular Observatory Office, Trocadéro, and register their names. A series of lectures on practical observations will soon begin. A room is also reserved for microscopical observations, which will be opened during the daytime.

The Sheffield Public Museum boasts of an equatorially mounted telescope which the public are permitted to use under certain restrictions and under the direction of Mr. E. Howarth, the curator.

M. Hervé-Mangon, the new director of the Conservatoire des Arts et Métiers, gave yesterday a great dinner in honour of Mr. Graham Bell, the inventor of the photophone, which was exhibited and tried in that establishment.

The Calisaya bark plants cultivated in Jamaica appear to have been replaced by an inferior hybrid between true *Cinchona Calisaya* and *C. succirubra*. In order to remedy this state of things Mr. J. E. Howard, F.R.S., the well-known quinologist, liberally placed cuttings from his authentic plant of *Cinchona Ledgeriana* at the disposal of the Royal Gardens, Kew. Three healthy plants raised from this source have lately reached Jamaica, besides others which have been sent to Ceylon.

Camoensia maxima, the most striking leguminous plant known, has flowered for the first time in cultivation in the Botanic Garden, Trinidad, to which it was sent two years ago from Kew. Welwitsch found it abundantly in the forests of Angola. The flowers are nearly a foot long, with a reddish calyx and cream-coloured petals with a golden border. The standard is 3 4 in. broad, which gives some idea of the scale of the other parts. There are living plants also at Kew, but at present it has shown no indication of flowering under glass.

A correspondent states that when he was a schoolboy at Hamburg, male crickets (species not indicated) were sold there in cages made of four playing-cards, and at the rate of a penny a-piece.

Another correspondent states that the electric lamps illuminating a large concert-room in the Champs Elysées at Paris, a year or two ago, were extremely attractive to insects of various orders. Who knows that the Thames Embankment may not become the nightly resort of members of the Entomological Society?

The Committee of the Topographical Society of London, which has been formed for the purpose of collecting and publishing maps, views, and other materials for the history of London, have made arrangements for the holding of the inaugural meeting of the Society on Thursday, the 28th inst., at 4 o'clock. The Lord Mayor has granted the use of the Long Parlour at the Mansion House, and will preside on the occasion. Cards for the meeting may be obtained from Mr. Henry B. Wheatley, F.S.A., 18, John Street, Adelphi, W.C.

We are glad to see a new edition of the late Sir J. W. Lubbock's Star Maps, under the title of "The Stars in Six Maps on the Gnomonic Projection," with explanatory notes by Mr. James Glaisher, F.R.S. Letts, Son, and Co. are the publishers.

It is proposed that an International balloon race should take place at Paris on October 31. Active steps are being taken, and the necessary authorisation will be procured without difficulty from the public authorities, but an obstacle of a quite unexpected nature remains to be solved. For motives, which it is very difficult to determine, the Parisian Company who monopolise the gas, and sell it at the enormous price of threepence per cubic metre, refuse to dispose of the commodity to aëronauts. As no provision in the charter has been made for the right of inflating balloons, it remains to be seen whether or not the gas monopolists will persist in their refusal.

M. Sadi Carnot, the French Minister of Public Works, has appointed a Commission to explore the antiquities of the Regency of Tunis, and determine what works could be executed with advantage in a country of which the welfare is of such importance for the good of the largest French dependency.

The *Pester Lloyd* gives a detailed account of the earthquake which seems to have been felt generally all over Transylvania on the night between the 3rd and 4th inst. From about 7 o'clock in the evening rumbling noises were heard throughout the night, especially in the hilly districts. About 6.15 a.m. a shock was felt which lasted a couple of seconds, and the shock was repeated, in some places twice, in others as often as ten times. Doors were opened and shut, windows rattled, bells were rung. In several places a movement of the ground was felt, in a direction from north-west to south-east; in some places this movement lasted as long as ten seconds. In the neighbourhood of Tövis a small railway-station building was overthrown. At Felvinez the shocks were very severe, lasting fully two minutes. Several public buildings had rents in the walls, and nearly the whole of the ceiling of the Reformed Church fell. At Bistritz the people were so alarmed that they rushed from their beds into the streets and open places. In general the disturbance was greater in the western portion of the province.

An interesting "Note on the Distribution of some of the more important Trees of British Columbia" has been contributed by Mr. George M. Dawson to a recent number of the *Canadian*

Naturalist. In a brief review of the general characters of the vegetation of the country the peculiarities in distribution are pointed out. The arrangement of the trees referred to is not based on any scientific principle, the Coniferæ being "placed first, as having the greatest importance both from an economic point of view and from the vast extent of country which they cover almost to the exclusion of other trees." Considering the variety of well-known timber trees to be found in British Columbia one is scarcely prepared to find it stated, with regard to the Douglas Fir (*Pseudotsuga Douglasii* or *Abies Douglasii*), that it is the "most important timber tree of British Columbia, and the only one of which the wood has yet become an article of export on a large scale." The best grown specimens of this noble tree are stated to be found near the coast in proximity to the waters of the many bays and inlets which indent it. In these situations the tree frequently exceeds eight feet in diameter at some considerable height from the ground, the height of the tree itself ranging from 200 to over 300 feet. "The wood varies considerably in appearance and strength according to its locality of growth and other circumstances. It is admirably adapted for all ordinary purposes of construction, and of late has obtained favourable notice in shipbuilding, remaining sound in water for a long time. For spars and masts it is unsurpassed, both as to strength, straightness, and length. Masts for export are usually hewn to octagonal shape from 20 to 32 inches in diameter by 120 feet long. Yards are generally hewn out from 12 to 24 inches in diameter and 50 to 102 feet long. Masts and spars are generally sent to Great Britain; other forms of timber to South America, Australia, India, China, and the Sandwich Islands. Of the *Thuja gigantea,* which in favourable situations on the coast reaches a height of 100 to 150 feet, the pale yellowish or reddish wood is stated to be very durable, though not extensively used except for shingles. The large and elegant canoes of the Indians are made of the hollowed trunks, and the fibre of the inner bark is used for ropes and cordage, as well as for paper-making and other purposes. One of the most remarkable uses for a wood is referred to under *Pinus contorta,* where it is said that the cambium layer contains much sugar, and for that reason it is eaten by the natives in the spring of the year, and in some instances large quantities of it are collected and dried for winter use.

The *Boston Herald* gives the following account of an American experiment made on September 2:—"A novel exhibition of powerful electric lights was made last evening in the vicinity of the Sea Foam-house, Nantucket Beach, and the display was witnessed by quite a crowd of interested spectators. The Northern Electric Light Company have erected three wooden towers, each 100 feet high, and mounted upon each of these a circular row of twelve electric lights of the Weston patent, each light being estimated at 2,500-candle power. As these towers are but 500 feet apart and in a triangle, it will be seen that the light of 90,000 candles was concentrated within a limited territory. The design of the exhibition was to afford a model of the plan contemplated for lighting cities from overhead in vast areas, the estimate being that four towers to a square mile of area, each mounting lights aggregating 90,000-candle power, will suffice to flood the territory about with a light almost equal to midday. Last evening a motive power of thirty-six horses was used in generating the electricity from three Western machines, and the lights, with one single slight flicker, burned steadily and brilliantly all the evening. It is difficult to say whether the experiment proved anything or not. The claim put forward by the company is for an original plan of lighting cities and towns by grouping and elevating electric lights of any kind."

We have received Part I of the *Transactions* of the Epping Forest and Essex Field Club, containing Mr. Henry Walker's interesting lecture on "A Day's Elephant Hunting in Essex."

At the Leeds Philosophical and Literary Society the following are among the lectures to be given this winter:—October 20, Prof. Silvanus P. Thompson, D.Sc., "Waves of Sound and the Photophone"; November 16, H. Clifton Sorby, LL.D., F.R.S., "The Structure and Origin of Meteorites and Meteoric Iron"; December 7, Dr. Sydney H. Vines, "The Nutrition of Plants"; December 21, Prof. E. Ray Lankester, F.R.S., "Degeneration"; February 15, 1881, Prof. T. E. Thorpe, Ph.D., F.R.S., "The Azores"; March 1, J. W. Swan, "The Electric Light, with Demonstrations."

OUR ASTRONOMICAL COLUMN

The Binary Star δ Equulei.—Mr. Burnham publishes a new epoch for this star, which there is now good reason to conclude will prove to be the most rapid revolver amongst the binary systems; on this account it well deserves the attention which Mr. Burnham claims for it at the hands of those observers who are in possession of instruments competent to cope with so close a double-star. The duplicity was detected by M. Otto Struve on August 19, 1852, with the Pulkowa refractor, when definition was unusually good, and the components almost equal in magnitude were "à peine séparées par une ligne noire." In 1853 and 1854 it appeared single in the same instrument. The object was elongated in the summer of 1857, and at the date 1858·59 M. Struve saw the stars separated at moments, and they were again divided in the autumn of 1874. As is pointed out in the Pulkowa Observations, vol. ix., the case is evidently a similar one to that of 42 Comæ Beren., the visual-ray coinciding very nearly with the plane of the orbit, so that the companion appears to oscillate backwards and forwards almost in a right line, and that of very small extent. M. Struve has established the period of revolution of 42 Comæ to be only about twenty-five years, but δ Equulei appears to indicate a period of only thirteen or fourteen years. Mr. Burnham finds from five nights' measures with the 18½-inch Chicago refractor,

1880·60, Position 29°·1, Distance 0″·35.

In September, 1870, Dunér remarked of this star: "Oblongue, j'en suis bien sur. Les diamètres sont comme 3 : 5," and the angle was estimated 8°. The only measures except Mr. Burnham's are those of M. Otto Struve. The magnitudes of the components are so nearly equal (the American observer considered there was a difference of only about two or three tenths of a magnitude), that care will be necessary to place the smaller star in its proper quadrant. Mr. Burnham adds: "It seems certain that it is measurable with any good instrument of ten inches aperture and upwards at least one year in every six years," and he believes that it is now near its maximum distance.

Faye's Comet.—The following positions are extracted from Dr. Axel-Möller's ephemeris for Berlin midnight:—

	R.A.			N.P.D.		Log. distance from	
	h.	m.	s.	°	′	Earth.	Sun.
Oct. 22	22	48	22	88	50·8	0·0506	0·2892
24	—	48	58	89	9·8	0·0532	
26	—	49	43	89	27·8	0·0561	0·2855
28	—	50	37	89	45·0	0·0591	
30	—	51	39	90	1·2	0·0623	0·2819
Nov. 1	—	52	50	90	16·5	0·0656	
3	—	54	9	90	30·7	0·0691	0·2785
5	—	55	37	90	43·8	0·0727	
7	22	57	2	90	55·9	0·0764	0·2751

The comet remains sensibly at the same intensity of light (not far from the maximum of the present appearance) during this period. On October 26 it will be within 20′ from 1 Piscium (B.A.C. 7985), and on November 3 very close to 3 Piscium (B.A.C. 8012), stars of the sixth magnitude.

Hartwig's Comet.—The subjoined places of this comet are from the calculations of Dr. Oppenheim, and are also for Berlin midnight:—

	R.A.			N.P.D.		Log. distance from	
	h.	m.	s.	°	′	Earth.	Sun.
Oct. 22	17	52	1	76	23·8	0·0582	0·0610
24	17	58	30	77	13·0	0·0826	
26	18	4	22	77	57·3	0·1057	0·0883
28	18	9	43	78	37·2	0·1276	
30	18	14	39	79	13·2	0·1483	0·1136
Nov. 1	18	19	13	79	45·7	0·1680	
3	18	23	26	80	15·1	0·1868	0·1370